

MINIMUM SKYLIGHT AREA WORKSHEET**(Page 1 of 3) ENV-4C****MINIMUM SKYLIGHT AREA FOR LARGE ENCLOSED SPACES** (definitions in §131(c), requirements in §143c)

Project Name:

Date:

☒ ☐ This worksheet applies to buildings with three or fewer stories, in climate zones 2 through 15, having an enclosed space > 8,000ft² that is directly under a roof, with a ceiling height > 15 ft and the exception below does not apply. **Go to Step 1.**

- Name or reference of Large Enclosed Space on building plans _____.
- Proposed daylight area is indicated on page _____ of the building plans.

☒ ☐ Skylights not required as fully designed lighting system as shown on page _____ of building plans has general lighting power density of _____ W/ft², which is less than 0.5 W/ft². **Note:** this exemption applies only to buildings with a fully designed lighting system. This exception does not apply to core & shell buildings.

STOP HERE IF THIS BOX IS CHECKED. Space is exempt from minimum skylight area requirement.

NOTE: The minimum skylight area requirements can be met using skylit daylight areas, primary sidelit daylight areas, or a combination of both. Use Step 1 below if using skylit daylight areas for compliance. Use Step 2 below if using sidelit daylight areas for compliance. Use Step 3 below to add together skylit daylight and primary sidelit daylight areas.

Step 1 Calculate if Proposed Skylit Daylight Area is greater than or equal to Minimum Daylight Area.

☐ **Criterion 1: Check if Total Proposed Skylit Daylight Area is greater than or equal to Minimum Daylit Area. ($C \geq B$)**

If Criterion 1 is checked, skip step 2. Go to Step 3.

Floor Area of proposed design large enclosed space	A	ft ²	Space floor area
Minimum Daylight Area = 0.5 x Floor Area (A)	B	ft ²	Minimum Daylight Area = 0.5 x (A)
Proposed design skylit daylight area in accordance with §131(c)1D and as shown on the plans.	C	ft ²	Proposed Skylit Daylight Area

Step 2 Calculate if Proposed Primary Sidelit Daylight Area is greater than or equal to Minimum Daylight Area

☐ **Criterion 2: Check if Total Proposed Sidelit Daylight Area is equal to or greater than Minimum Daylit Area ($D \geq B$)**

Primary sidelit daylight area determined in accordance with §131(c)1B and as shown on the plans	D	ft ²	Proposed Primary Sidelit Daylight Area
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Step 3 Confirm that Proposed Primary Sidelit + Skylit Daylight Area is greater than or equal to Minimum Daylight Area

☐ **Criterion 3: Check if Total Proposed Daylight Area is greater than or equal to Minimum Daylit Area ($E \geq B$)**

Total Proposed Daylight Area = Skylit Area + Primary Sidelit Area Add C + D and enter into E	E	ft ²	Total Proposed Daylit Area
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If Criterion 3 is checked complete both Steps 4 & 5 on Page 2

☐ If Criterion 3 is unchecked. Space FAILS, insufficient daylight area, do not continue.

MINIMUM SKYLIGHT AREA WORKSHEET**(Page 2 of 3)****ENV-4C****SKYLIGHT AREA FOR LARGE ENCLOSED SPACES (§ 143c)**

Project Name:

Date:

Step 4 – If using SKYLIGHT to comply with the minimum skylight area requirements, calculate compliance with minimum skylight area using Step 4a, or compliance with minimum effective aperture using Step 4b. Also verify compliance with skylight haze criteria is met in Step 4c.

Step 4a – If complying with minimum skylight area:

☐ **Criterion 4a: Check if Proposed Skylight Area is equal to or greater than Minimum Skylight Area ($H \geq G$)**

Proposed Skylit Daylight Area from cell (C), Step 1, on ENV-4C (Page 1 of 3)	F	ft ²	Proposed Skylit Daylight Area
Minimum Skylight Area = Skylit Daylight Area (F) x 0.033	G	ft ²	Minimum Skylight Area
Total Proposed Skylight Area = Sum of the areas (rough opening) of each individual skylight	H	ft ²	Total Proposed Skylight Area

Step 4b – If complying with minimum effective aperture:

☐ **Criterion 4b: Check if Proposed Skylight Effective Aperture is equal to or greater than Minimum Skylight Effective Aperture ($J \geq I$). If this criterion checked, shall also fill out ENV 4C (Page 3 of 3)**

Minimum Skylight Effective Aperture	I	0.011	Minimum Skylight Effective Aperture
Proposed Skylight Effective Aperture. Shall be taken from ENV-4C (Page 3 of 3) Cell (AB)	J		Proposed Skylight Effective Aperture

Step 4c Required

☐ **Criterion 4c: Check if Proposed Skylight glazing or diffuser haze rating is equal or greater than 90% ($K \geq 0.9$).**

Skylight glazing or diffuser haze rating according to ASTM D1003	K		Haze rating
Haze rating is indicated on page _____			of plans

☐ **Complies with all of Criterion 4 if either Criterion 4a or Criterion 4b is checked, AND Criterion 4c is checked.**

Step 5 – If using PRIMARY SIDELIGHT to comply with the minimum skylight area requirements:

☐ **Criterion 5: Check if Proposed Primary Sidelit Effective Aperture is greater than or equal to Minimum Sidelit Effective Aperture ($M \geq L$). Fill out remaining questions on Step 6 below.**

Minimum Sidelit Effective Aperture	L	0.1	Minimum Sidelit Effective Aperture
Enter Proposed Primary Sidelit Effective Aperture from Equation 146-A- cell (Q) below	M		Proposed Primary Sidelit Effective Aperture

EQUATION 146-A: Determine Effective Aperture for Primary Sidelit Area

Rough opening of windows adjacent to the sidelit are in square feet	N		Total window area
Visible light transmittance of window	O		Average VLT
Primary sidelit daylight area determined according to §131(c)1 from cell (D), Step 2, on ENV-4C (Page 1 of 3)	P		Primary Sidelit Area
Primary Sidelit Effective Aperture = $(N \times O) / (P)$ Enter results for Primary Sidelit Effective Aperture from cell (Q) into cell (M) in Step 5	Q		Primary Sidelit EA

Step 6

☐ **Space PASSES:** Check if Criterion 1 and 3 (page 1); and, Criterion 4 (page 2) are checked.

☐ **Space PASSES:** Check if Criterion 2 and 3 (page 1); and, Criterion 5 (page 2) are checked.

☐ **Space PASSES:** Check only if Criterion 1 through 5 are all checked

Calculate Skylight Effective Aperture

Project Name:

Date:

Calculate Skylight Effective Aperture (EQUATION 146-C) if using minimum effective aperture in Step 4b to comply with the minimum skylight area requirements.

1. Determine Well Cavity Ratio or L/D ratio. Select one of the well types (Rectangular or Non-Rectangular), fill in well dimensions and calculate the Wall Cavity Ratio (WCR) with the appropriate equation below.

Rectangular. Wells: <input type="checkbox"/>	a. Well Height	b. Well Length	c. Well Width	
$WCR = \left(\frac{5 \times \text{well height} (\text{well length} + \text{well width})}{\text{well length} \times \text{well width}} \right)$				R.
				Rectangular WCR

Non-Rectangular Wells: <input type="checkbox"/>	a. Well Height	b. Well Perimeter	c. Well Area	
$WCR = \left(\frac{2.5 \times \text{well height} \times \text{well perimeter}}{\text{well area}} \right)$				S.
				Non-rectangular WCR

If using Tubular Specular Light Well provide the following information:

T. Tube Length (ft)

T

Tube Height

U. Tube Diameter (ft)

U

Tube Diameter

V. Divide Tube Length (Height) by Tube Diameter

V

L/D Ratio = (T/U)
2. Determine Well Efficiency

W. Weighted Average Well Wall Reflectance (%)

W.

Wall reflectance

X. Well Efficiency

X.

Well Efficiency
☒ From Table 146-A for non-specular or non-tubular light wells

☒ From Equation 146-F or Table 146-B for specular tubular light wells

3. Calculate Skylight Effective Aperture

Y. Total skylight area

Y.

Total Skylight Area

Z. Visible transmittance in accordance with description in §146(a)2, Equation 146-C

Z.

VT

AA. Proposed Skylit Daylight Area from cell (C) on ENV-4C (Page 1 of 3)

AA.

Skylit Daylight Area

 AB. Skylit EA = $0.85 \times (Y \times Z \times X) / AA$
AB.

Skylight EA

$$\text{Skylight Effective Aperture} = \left(\frac{0.85 \times \sum \text{SkylightArea} \times VT \times \text{WellEfficiency}}{\text{Skylight Daylight Area}} \right)$$

4. Enter ratio from cell (AB) into ENV-4C (Page 1 of 3) Step 4b cell (J)